

Reg. No. :

Name :

Fourth Semester B.Sc. Degree Examination, August 2022

Career Related First Degree Programme under CBCSS

Chemistry

Complementary Course IV for Biochemistry and Industrial Microbiology

CH 1431.7 BIOINORGANIC AND ELECTROCHEMISTRY

(2013-2018 Admissions)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions. Each question carry 1 mark.

1. m/z value of Base peak of toluene is _____
2. Among Primary, Secondary and Tertiary alkyl halides which one give S_N1 reaction in higher rate.
3. What are the x and y axes of a mass spectra?
4. Which equation is used to calculate equilibrium constant (K) from standard-state cell potential (E^0)?
5. Predict the shape and hybridization of $Ni(CO)_4$.
6. Write down the relation between G, and E.
7. Predict the major product of the reaction between HCl and 1-Butene.

P.T.O.

8. Standard reduction potential of $\text{Cr}^{3+}/\text{Cr} = -0.74 \text{ V}$ and $\text{Ag}^+/\text{Ag} = 0.80 \text{ V}$. Which of them works best as an anode and which works best as a cathode?
9. Predict the magnetism of $[\text{Cr}(\text{NH}_3)_6]^{2+}$.
10. What is linkage isomerism?

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions. Each question carry **2** marks.

11. Calculate the ionic mobility of Ag^+ , Molar ionic conductivity at infinite dilution of Ag^+ is $6.192 \times 10^{-3} \text{ Smol}^{-1}\text{m}^2$ at 25°C .
12. Derive the relationship between the standard cell potential and the equilibrium constant for the reaction.
13. Write any two reaction that leads through Benzyne mechanism.
14. Among following compound which one shows mass spectra with molecular ion line at odd value?
 - (a) $\text{C}_6\text{H}_5\text{NH}_2$
 - (b) $\text{C}_6\text{H}_5\text{OH}$
 - (c) C_6H_6
15. What are the factors that affect the conversion of Oxy haemoglobin to De-oxyhaemoglobin?
16. Draw the cis and trans isomers of $\text{Pt}(\text{NH}_3)_2\text{Cl}_2$ and $\text{Pt}(\text{NH}_3)_4\text{Cl}_2$.
17. In comparison with hydrogen and lithium which material is good anode material and why?
18. What are primary and secondary valences in coordination compounds?

19. Mention any two differences between hapticity and denticity with suitable examples.
20. Predict the products produced by the electrolysis of a water at the +ve and -ve electrodes.
21. How one can achieve Antimarkonikoffs addition during the hydroboration on alkene?
22. State any four factors that affect electrolytic conductance?

(8 × 2 = 16 Marks)

SECTION – C

Answer any six questions. Each question carries 4 marks.

23. Anode and cathode reactions are given below



Write down the electrochemical cell notation, Nernst equation and calculate the emf of the cell. Given $E^0(\text{Ag}^+/\text{Ag}) = 0.8\text{ V}$; $E^0(\text{Cu}^{2+}/\text{Cu}) = 0.34\text{ V}$.

24. Discuss the difference in hydration reaction on But1ene and But2ene.
25. Discuss difference in Hoffmann and Zaitseff elimination.
26. Propose scheme for following reaction on chlorobenzene
 - (a) Nitration
 - (b) Sulphonation.
27. Suggest two experimental technique to measure transport number.
28. Explain the Mc-lefferty rearrangement with example.

29. Predict magnetism and the effective atomic number for Fe in following compounds :
- (a) $[\text{Co}(\text{CN})_6]^{4-}$
 - (b) $[\text{Co}(\text{NH}_3)_6]^{3+}$
30. Describe the structure of Porphirin.
31. Suggest any two molecular fragments and corresponding m/z values observed in the mass spectra of
- (a) Hexane
 - (b) Hexanol
 - (c) Hexanaldehyde
 - (d) Cyclohexane.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. **Each** question carries **15** marks.

32. Discuss basic principle and instrumentation of mass spectrometer.
33. How Oxygen and carbon dioxides are transported through blood? Explain with the help of dissociation curve of Oxyhaemoglobin.
34. Explain the factors affecting Aliphatic and aromatic substitution reactions with suitable examples.
35. Explain shape, hybridization and Magnetic properties involved in following complexes with the help of valence bond theory.



(2 × 15 = 30 Marks)